CLAIMS

1.   A method for automated detection of suspicious lesions
5 in a digital mammogram, comprising the steps of:
        computing mass information corresponding to the
digital mammogram, said mass information having mass
location information;
        independent of said step of computing mass
10   information, computing spiculation information
corresponding to the digital mammogram, said spiculation
information having spiculation location information; and
        identifying suspicious lesions in the digital
mammogram using said mass information and said
15   spiculation information.

2.   The method of claim 1, wherein said step of computing
spiculation information is performed prior to or concurrently
with said step of computing mass information.
20
3.   The method of claim 2, wherein said spiculation
information is computed from a set of information other than
said mass information, for allowing faster and more reliable
detection of suspicious lesions in the digital mammogram.
25
4.   The method of claim 3, wherein said step of identifying
suspicious lesions includes the step of using a classifier
algorithm to classify a feature vector corresponding to at
least one location in said digital mammogram, each feature
30 vector comprising that portion of said mass information and
said spiculation information that corresponds to that
location.

5.   The method of claim 4, wherein said classifier algorithm
35 is used to classify feature vectors associated with each
location in said digital mammogram.

16

6. The method of claim 4, wherein said classifier algorithm comprises a linear classifier algorithm.

7. The method of claim 4, wherein said classifier comprises
5 a quadratic classifier algorithm.

8. The method of claim 6, said mass information comprising a mass metric, said spiculation information comprising a spiculation metric, said mass metric and said spiculation
10 metric being scalar quantities, said linear classifier algorithm comprising the steps of:

weighting said mass metric by a first weight to produce a weighted mass metric;

weighting said spiculation metric by a second
15 weight to produce a weighted spiculation metric;

combining said weighted mass metric and said weighted spiculation metric to produce a result;

comparing said result to a predetermined threshold;

identifying the corresponding location as
20 suspicious if said result is greater than said predetermined threshold;

and

identifying the corresponding location as normal if said result is not greater than said predetermined
25 threshold.

9. The method of claim 8, wherein said first weight, said second weight, and said predetermined threshold are determined using a training algorithm on a training set of digital mammograms, said training set comprising a plurality
30 of examples of suspicious lesions and a plurality of examples of normal breast structure.

10. A computer program product for directing a computing apparatus to automatically detect suspicious lesions in a
35 digital mammogram, thus permitting the suspicious lesions to be brought to the attention of a medical professional, said computer program product comprising:

PEMP-105312.1

17

computer code for computing mass information corresponding to the digital mammogram, said mass information having mass location information;

computer code for computing, independent of the

5   computation of said mass information, spiculation information corresponding to the digital mammogram, said spiculation information having spiculation location information; and

computer code for identifying suspicious lesions in

10 the digital mammogram using said mass information and said spiculation information.

11. The computer program product of claim 10, wherein said spiculation information is computed prior to or concurrently

15 with said step of computing mass information.

12. The computer program product of claim 11, wherein said computer code for identifying suspicious lesions includes computer code for using a classifier algorithm to classify a

20 feature vector corresponding to at least one location in said digital mammogram, each feature vector comprising that portion of said mass information and said spiculation information that corresponds to that location.

25 13. The computer program product of claim 12, wherein said classifier algorithm is used to classify feature vectors associated with each location in said digital mammogram.

14. The computer program product of claim 13, said mass

30 information comprising a mass metric, said spiculation information comprising a spiculation metric, said mass metric and said spiculation metric being scalar quantities, said linear classifier algorithm comprising the steps of:

weighting said mass metric by a first weight to

35 produce a weighted mass metric;

weighting said spiculation metric by a second weight to produce a weighted spiculation metric;

- 17 -

combining said weighted mass metric and said weighted spiculation metric to produce a result;

comparing said result to a predetermined threshold;

identifying the corresponding location as

5   suspicious if said result is greater than said predetermined threshold;

and

identifying the corresponding location as normal if said result is not greater than said predetermined

10   threshold.

15.   An automated system for detecting suspicious portions of a digitized mammogram, comprising:

means for computing mass information corresponding

15   to the digitized mammogram, said mass information having mass location information;

means for computing spiculation information corresponding to the digitized mammogram independent of said mass information, said spiculation information

20   having spiculation location information; and

means for classifying said mass information and said spiculation information for detecting the suspicious portions of the digital mammogram.

25   16.   The automated system of claim 15, wherein said means for computing spiculation information computes said spiculation information prior to or substantially in parallel with a period in which said means for computing mass information computes said mass information.

30

17.   The automated system of claim 16, wherein said means for computing spiculation information computes said spiculation information using data other than said mass information.

35   18.   The automated system of claim 17, wherein said means for classifying comprises:

19

means for computing at least one combined classification parameter defined by a combination of said mass information and said spiculation information; and
        means for identifying values for which said at
5 least one combined classification parameter corresponds to a suspicious portion of the digital mammogram.

19. The automated system of claim 17, wherein said means for classifying comprises means for implementing a neural network
10 algorithm capable of identifying the suspicious portions of the digital mammogram using said mass information and said spiculation information.

20. The automated system of claim 18, wherein said means for
15 classifying includes a look up table that is indexed according to scalar quantities associated with said mass information and said spiculation information.

20

25

30

35

PEMP-105312.1

90